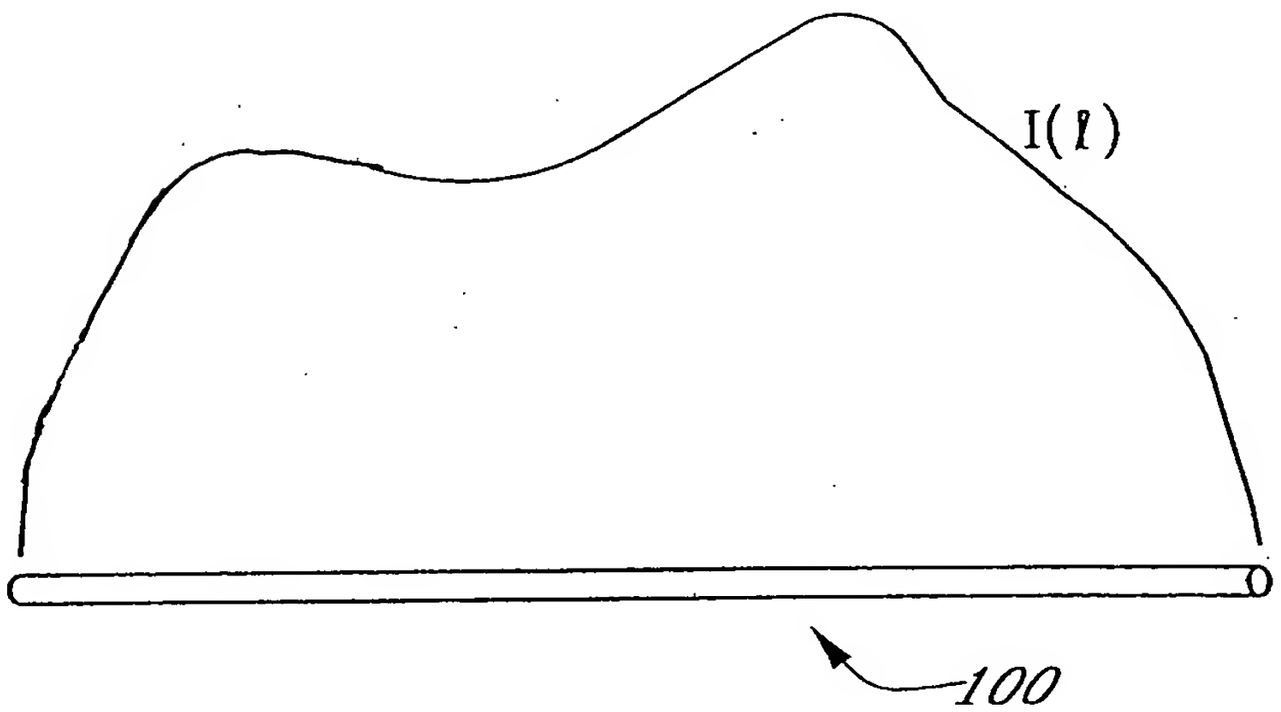


FIG. 1A

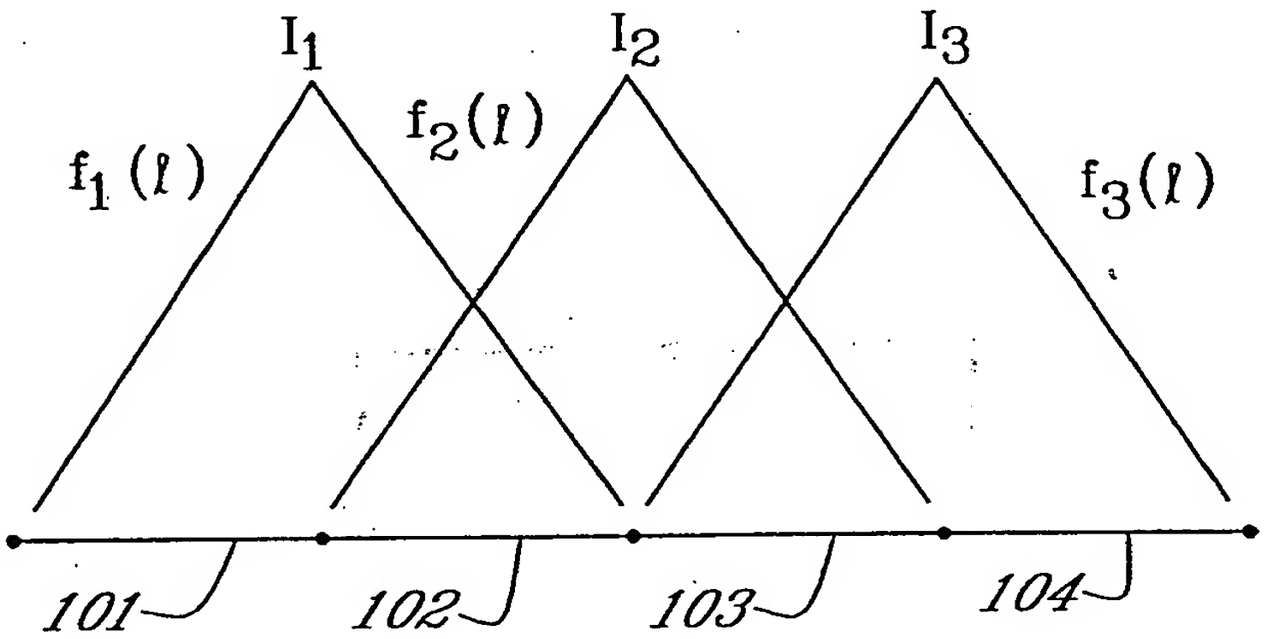


FIG. 1B

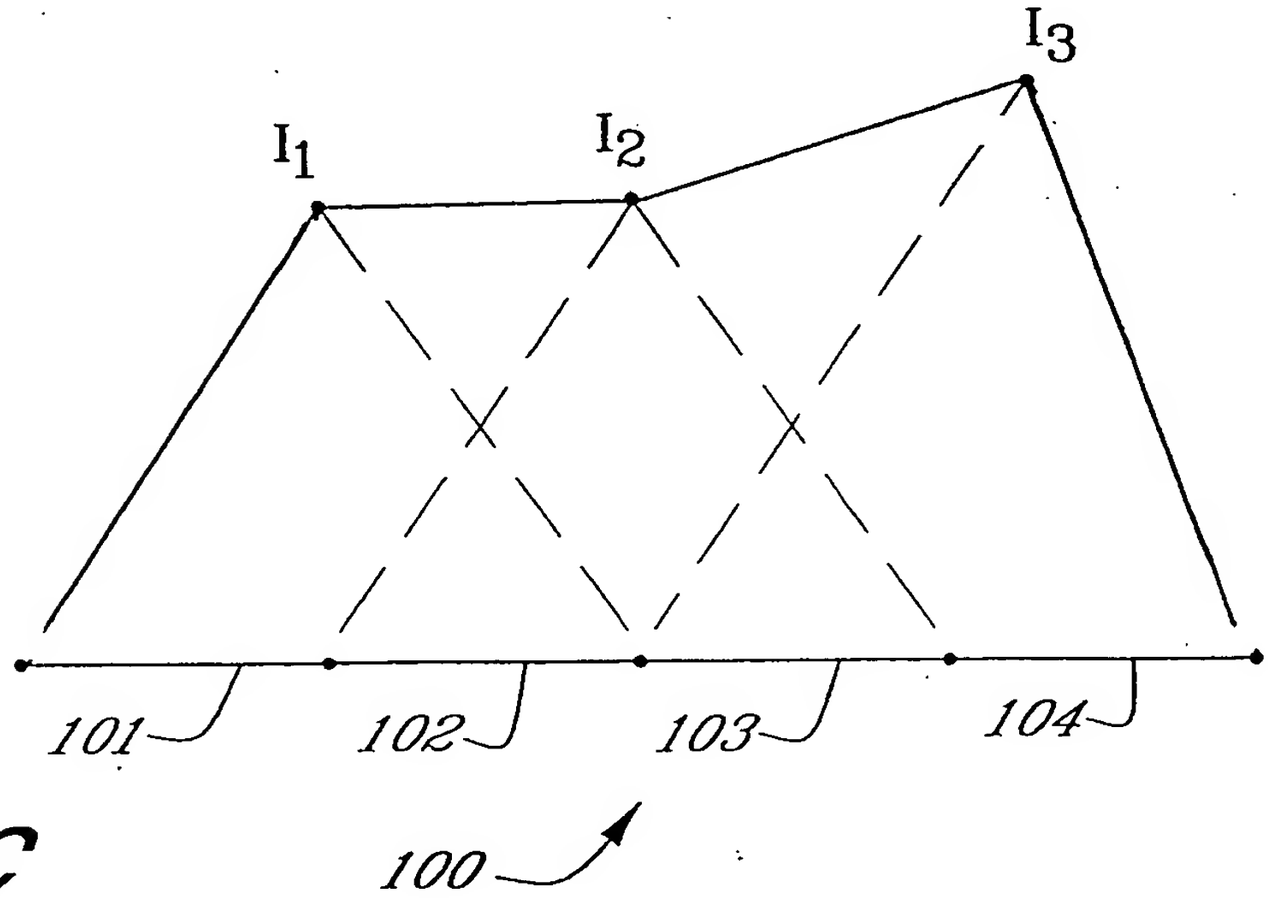


FIG. 1C

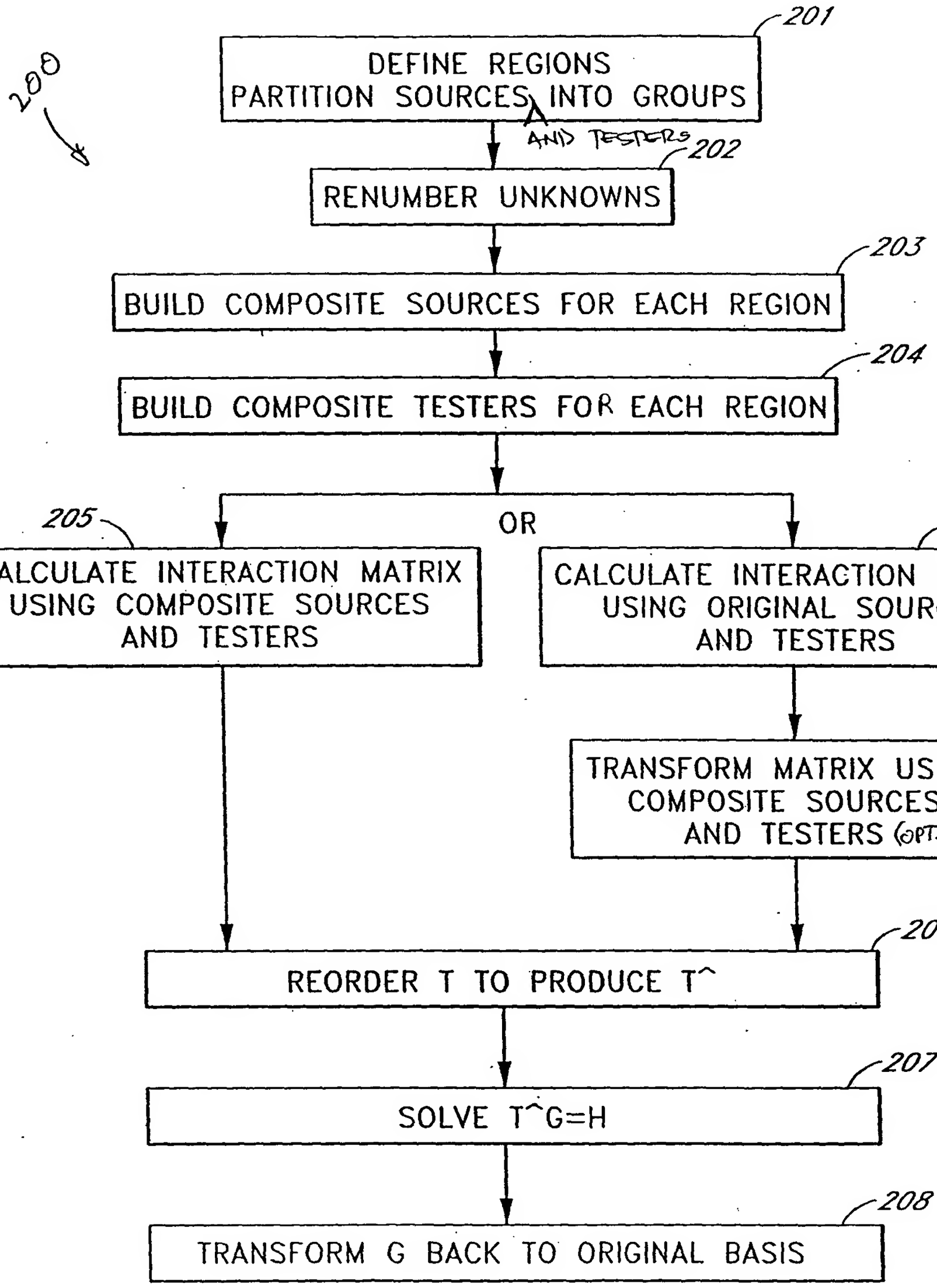

200
DEFINE REGIONS
PARTITION SOURCES INTO GROUPS
201
AND TESTERS
RENUMBER UNKNOWNS
202
BUILD COMPOSITE SOURCES FOR EACH REGION
203
BUILD COMPOSITE TESTERS FOR EACH REGION
204
OR
205
CALCULATE INTERACTION MATRIX USING COMPOSITE SOURCES AND TESTERS
215
CALCULATE INTERACTION MATRIX USING ORIGINAL SOURCES AND TESTERS
216
TRANSFORM MATRIX USING COMPOSITE SOURCES AND TESTERS (OPTIONAL)
206
REORDER T TO PRODUCE T^
207
SOLVE T^G=H
208
TRANSFORM G BACK TO ORIGINAL BASIS

FIG. 2

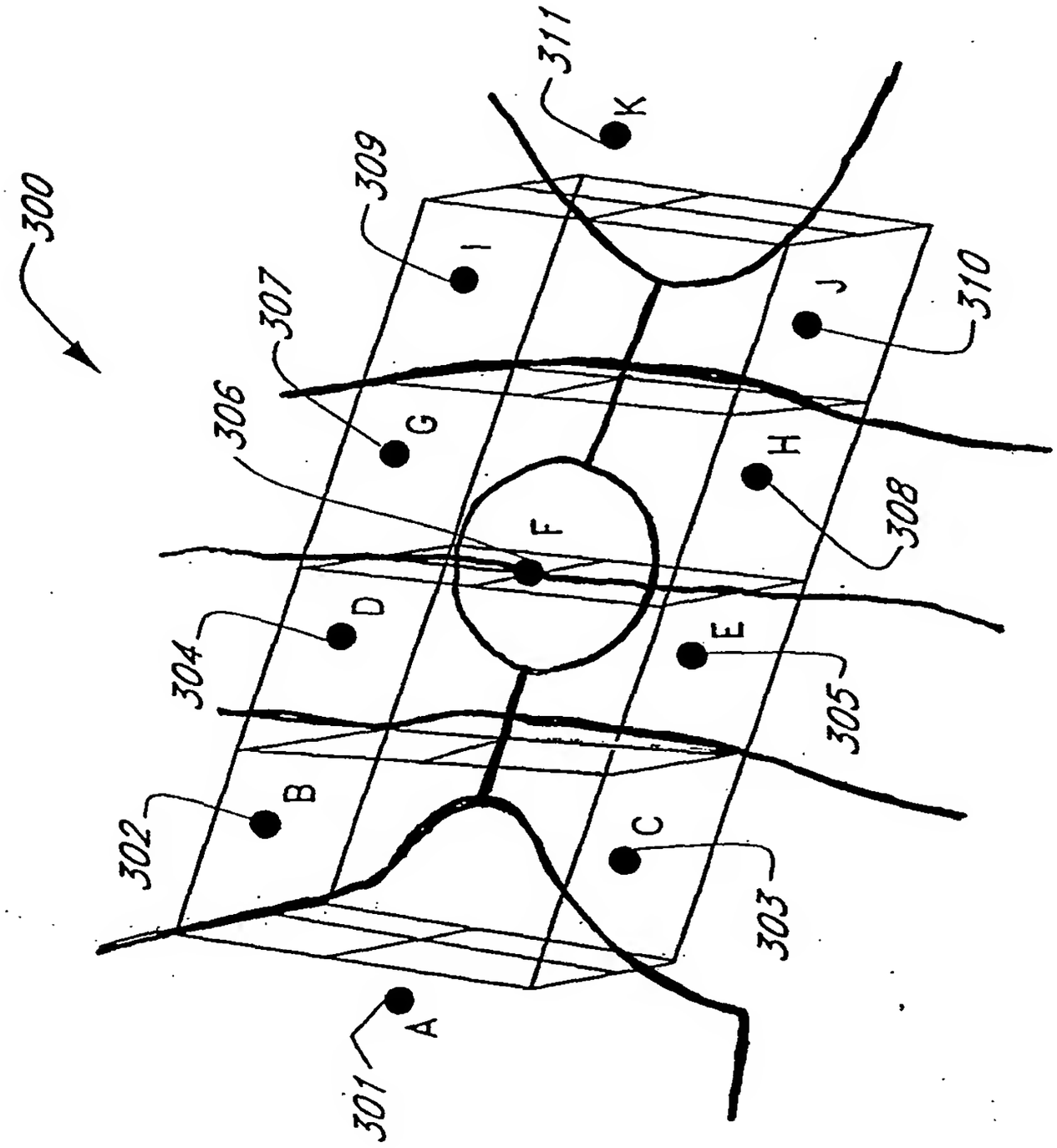


FIG. 3

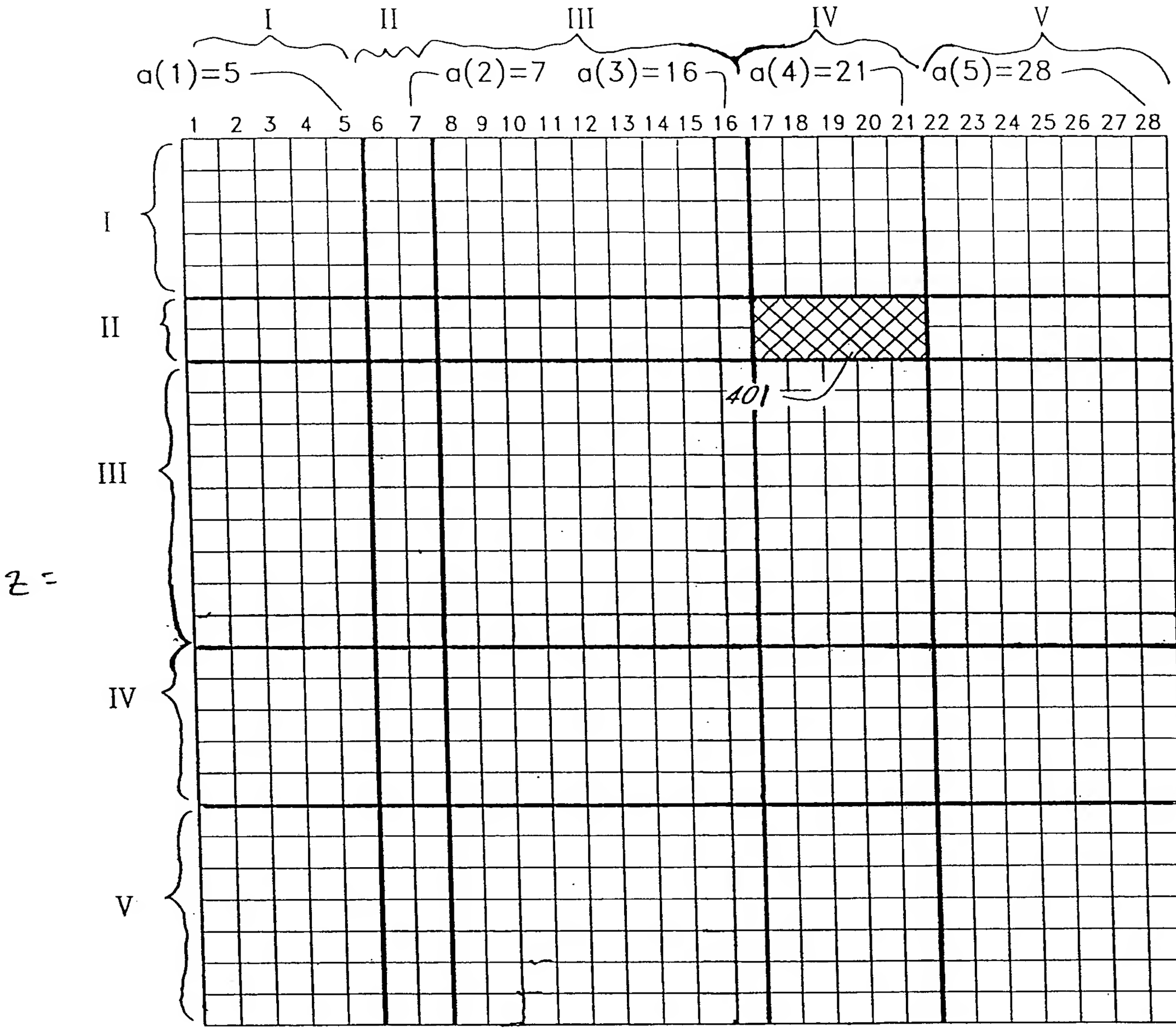

I
II
III
IV
V
a(1)=5
a(2)=7
a(3)=16
a(4)=21
a(5)=28
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
I
II
III
IV
V
401
Z =

FIG. 4

400

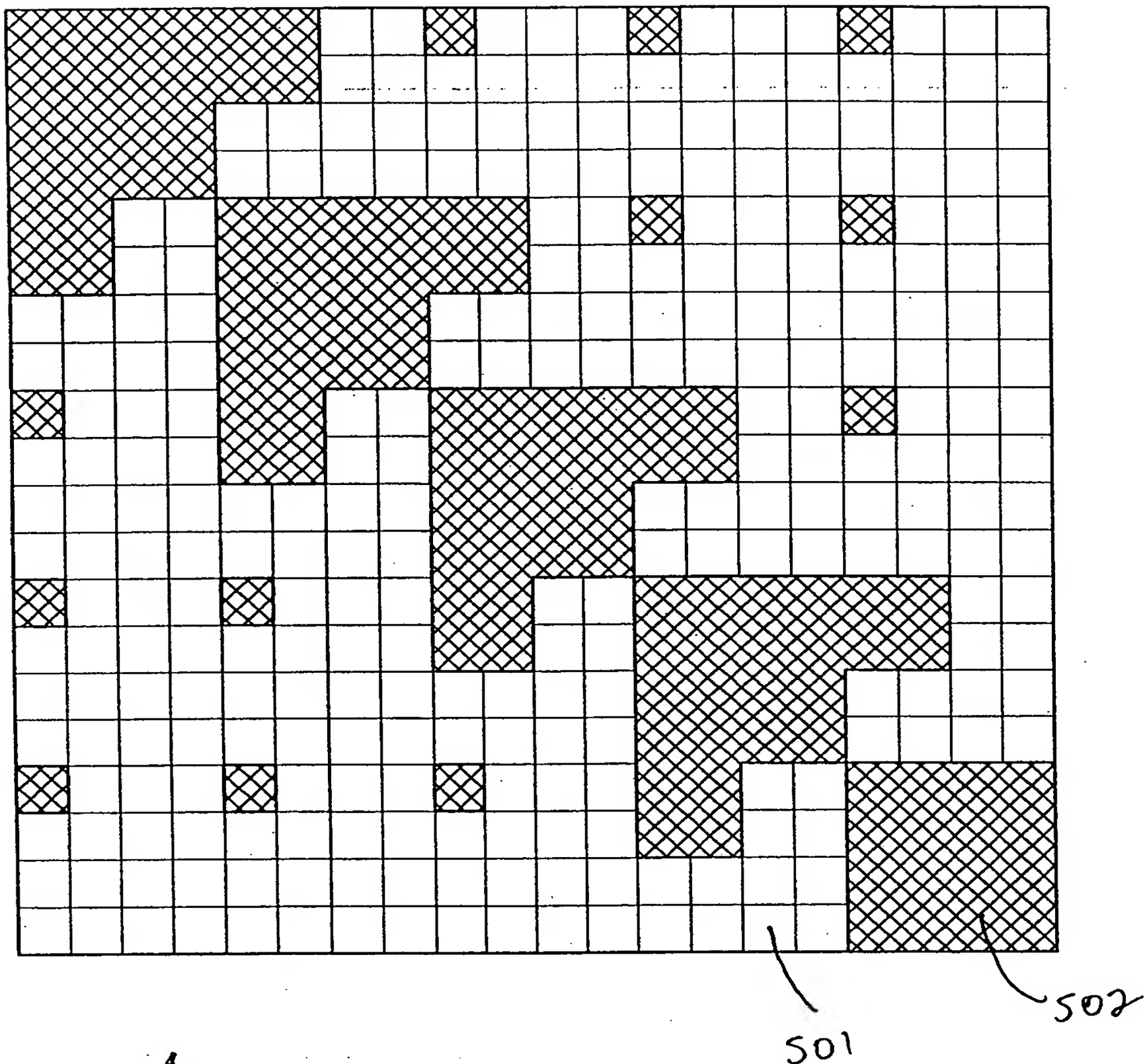


FIG. 5

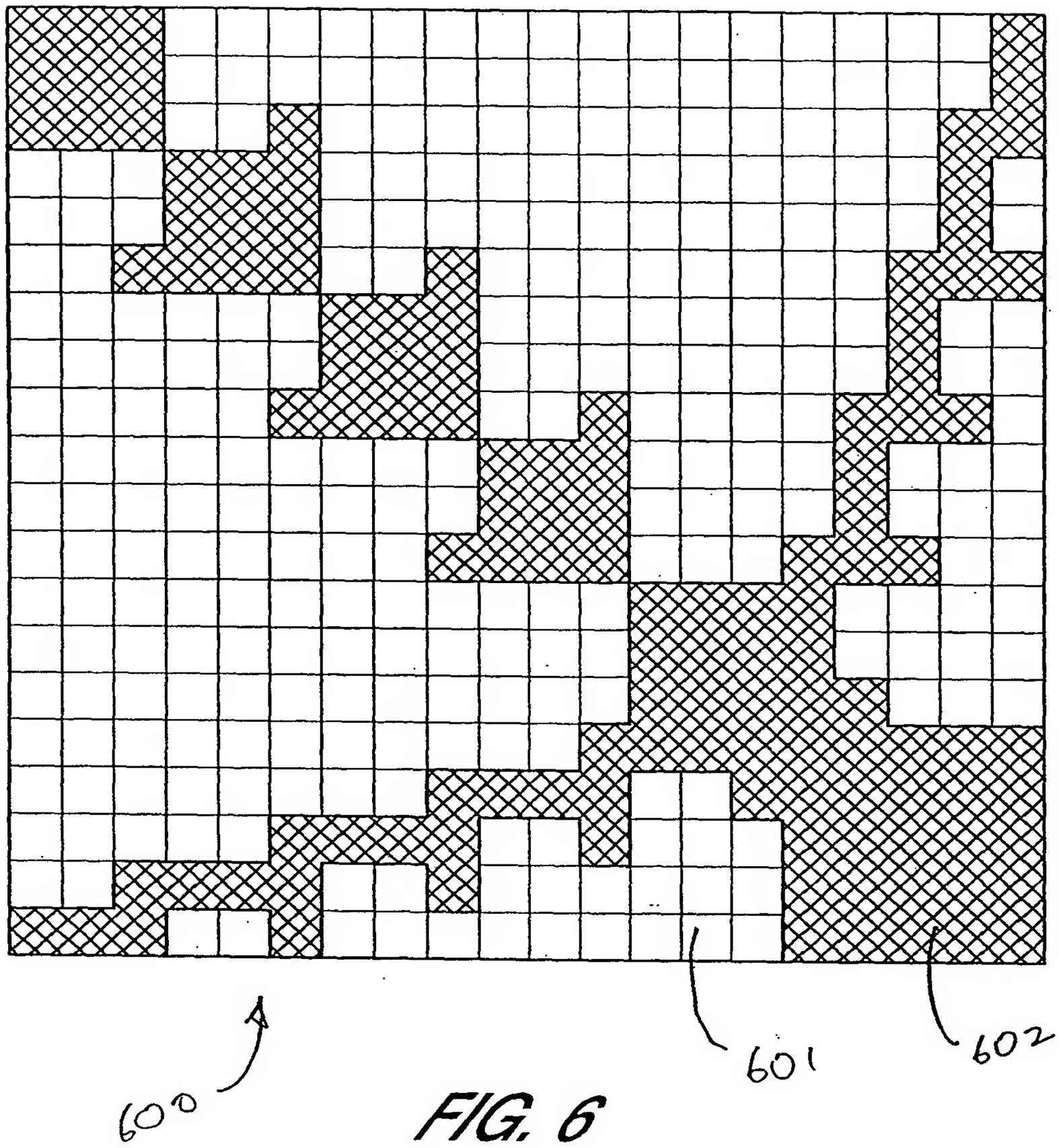
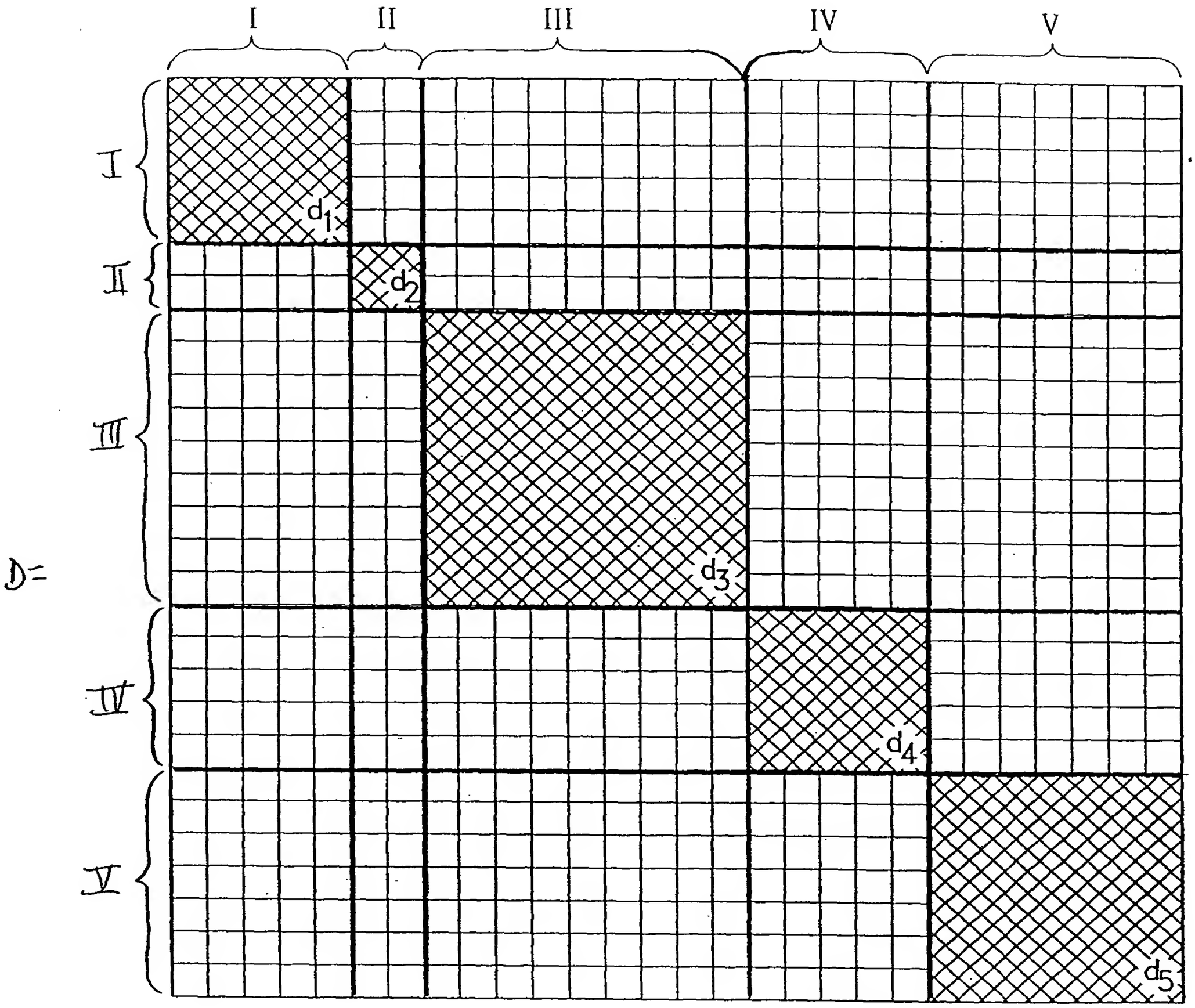


FIG. 6



700

FIG. 7

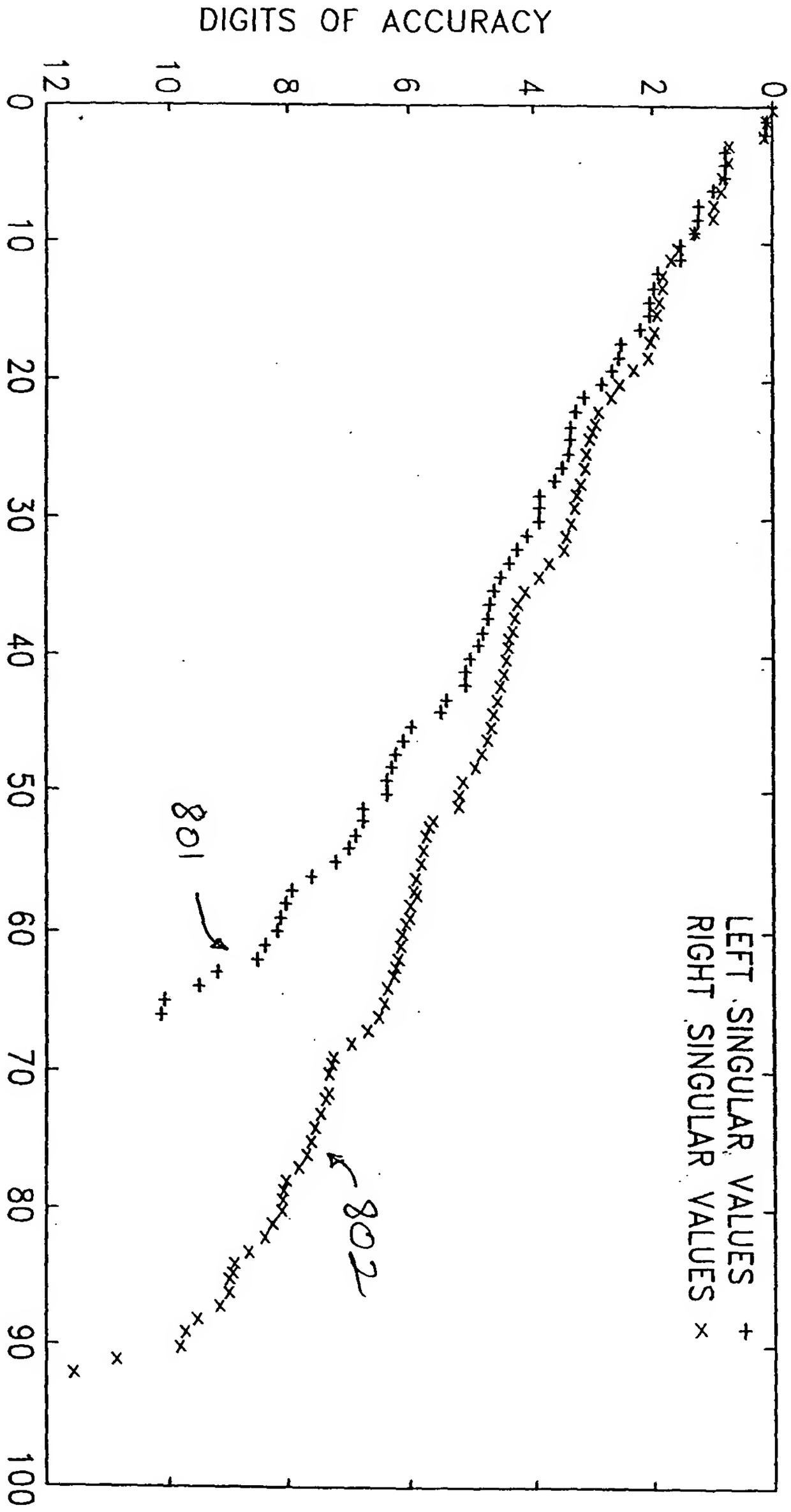

DIGITS OF ACCURACY
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
NUMBER OF BASIS FUNCTIONS
LEFT SINGULAR VALUES +
RIGHT SINGULAR VALUES ×
800
801
802

FIG. 8

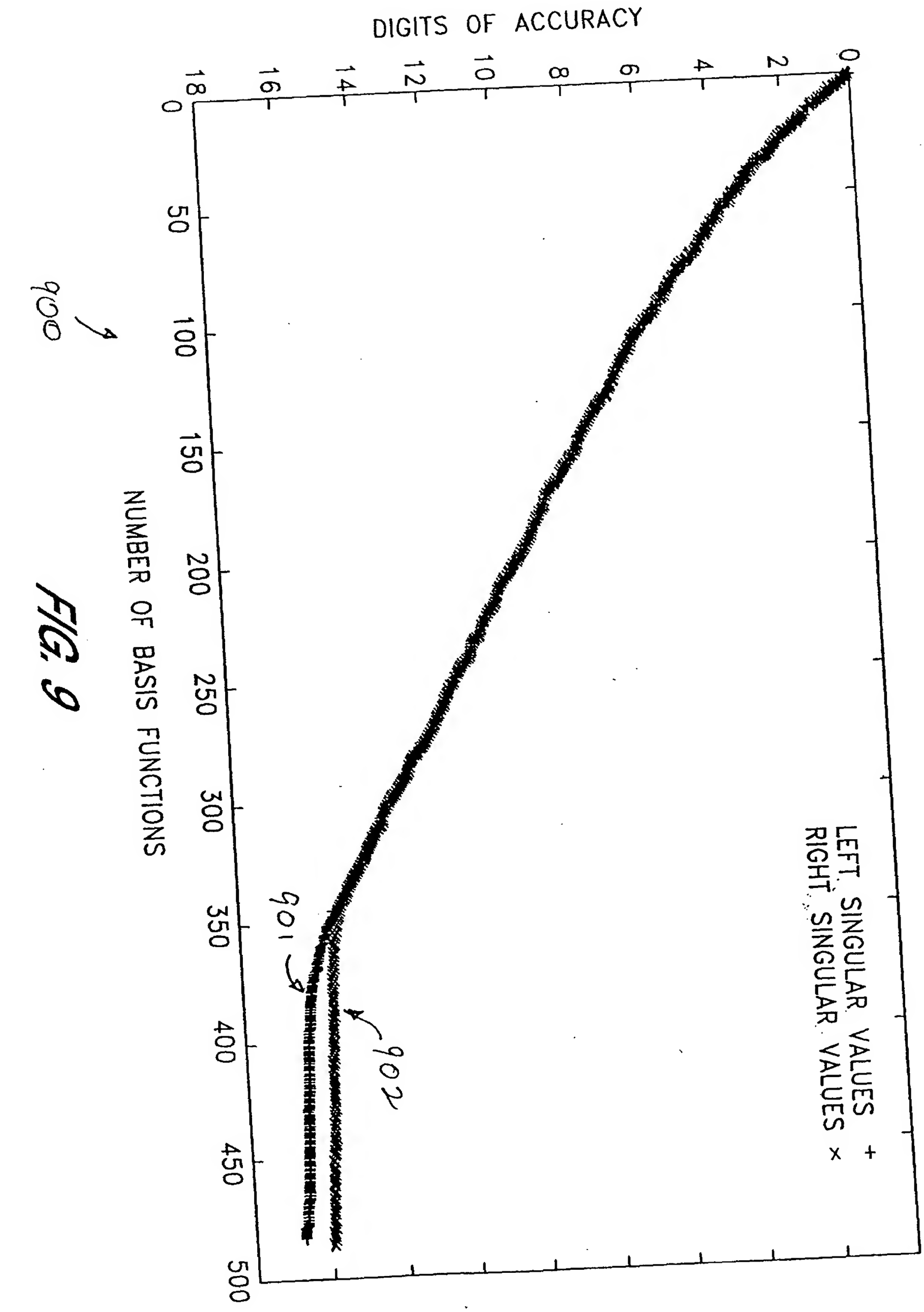

DIGITS OF ACCURACY
18
16
14
12
10
8
6
4
2
0
0
50
100
150
200
250
300
350
400
450
500
NUMBER OF BASIS FUNCTIONS
LEFT SINGULAR VALUES +
RIGHT SINGULAR VALUES ×
901
902

FIG. 9

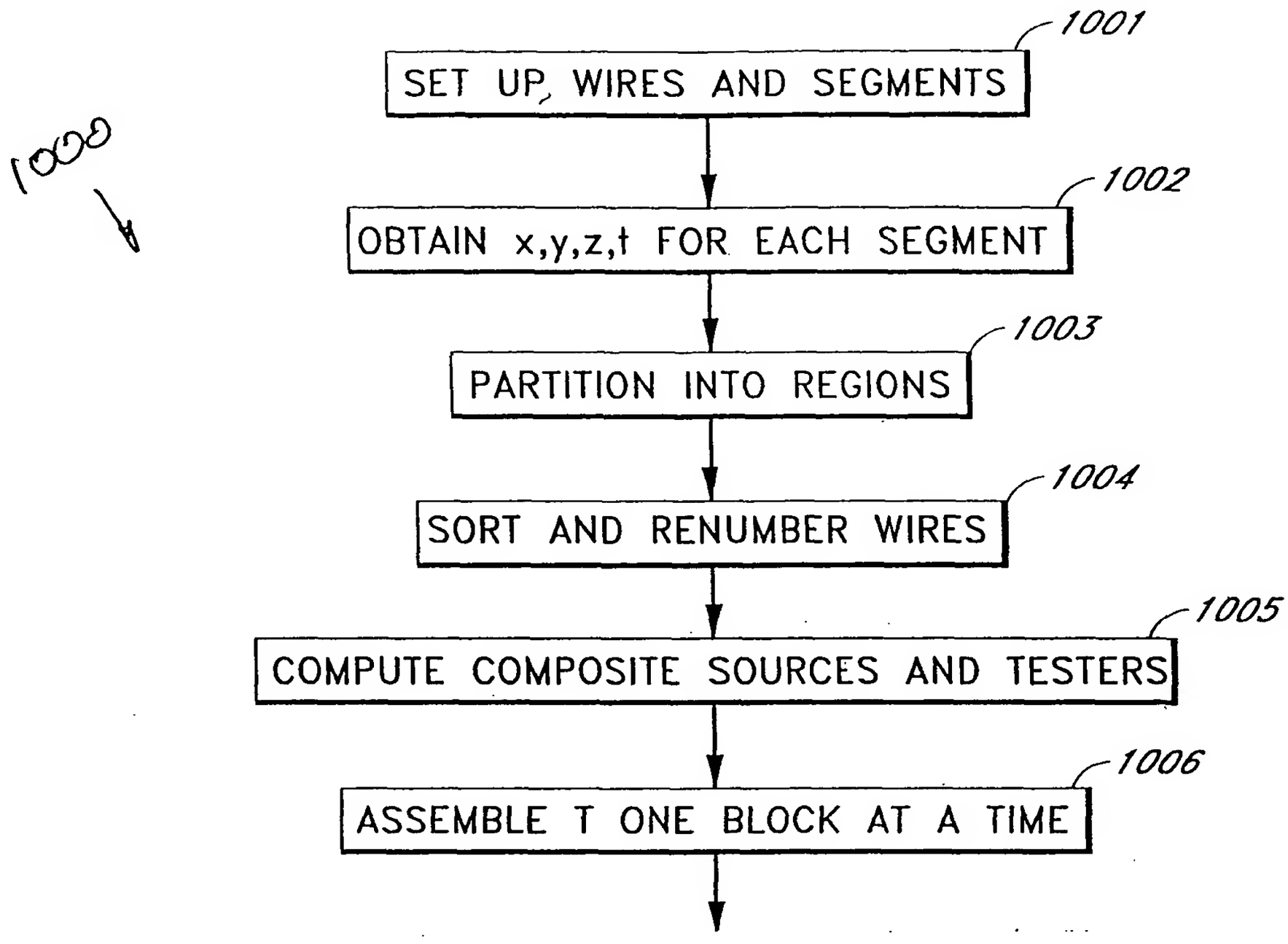
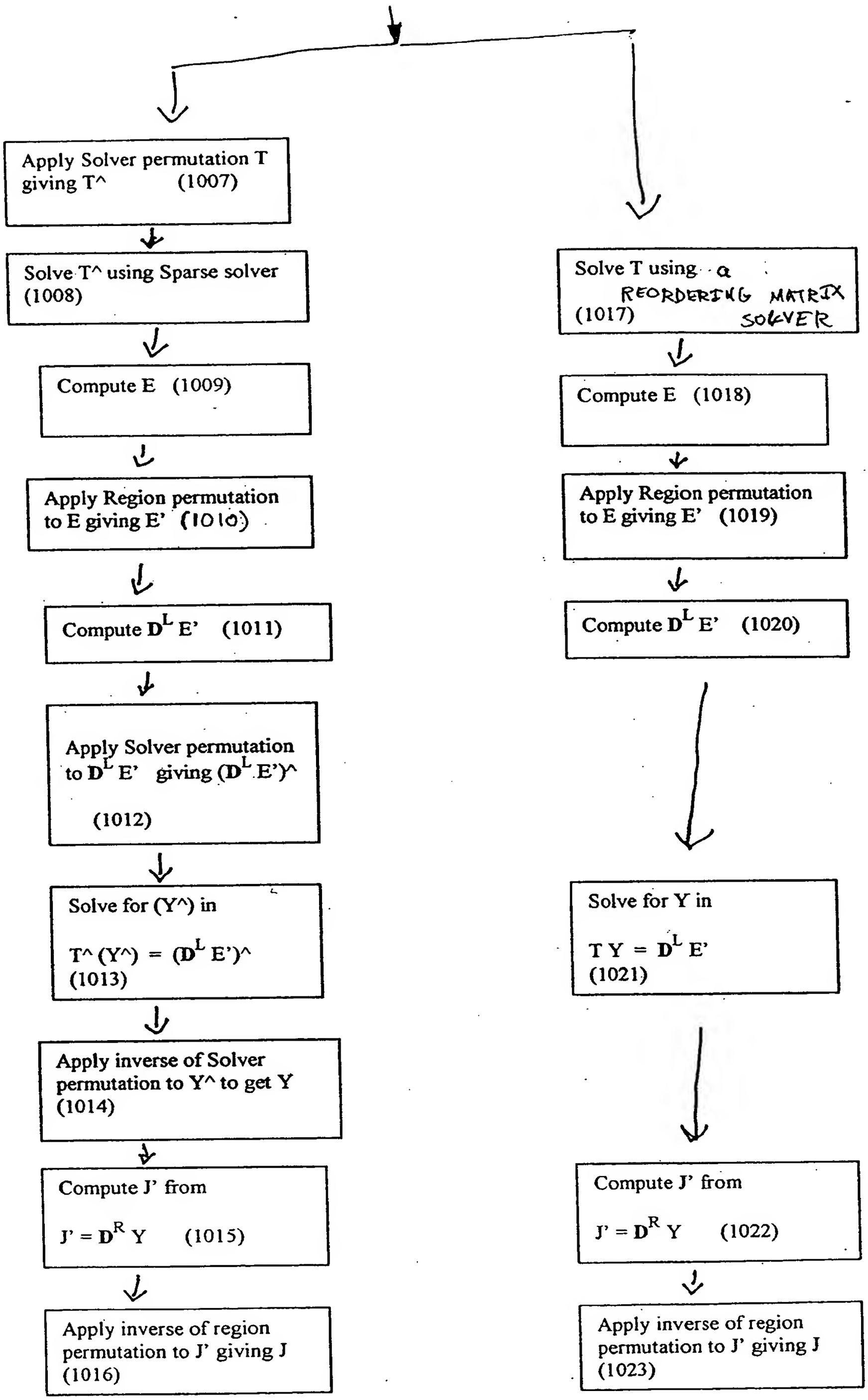

1000
1001
SET UP, WIRES AND SEGMENTS
1002
OBTAIN x,y,z,t FOR EACH SEGMENT
1003
PARTITION INTO REGIONS
1004
SORT AND RENUMBER WIRES
1005
COMPUTE COMPOSITE SOURCES AND TESTERS
1006
ASSEMBLE T ONE BLOCK AT A TIME

FIG. 10A


Apply Solver permutation T giving T^ (1007)
Solve T^ using Sparse solver (1008)
Compute E (1009)
Apply Region permutation to E giving E' (1010)
Compute D^L E' (1011)
Apply Solver permutation to D^L E' giving (D^L E')^ (1012)
Solve for (Y^) in T^ (Y^) = (D^L E')^ (1013)
Apply inverse of Solver permutation to Y^ to get Y (1014)
Compute J' from J' = D^R Y (1015)
Apply inverse of region permutation to J' giving J (1016)
Solve T using a REORDERING MATRIX SOLVER (1017)
Compute E (1018)
Apply Region permutation to E giving E' (1019)
Compute D^L E' (1020)
Solve for Y in T Y = D^L E' (1021)
Compute J' from J' = D^R Y (1022)
Apply inverse of region permutation to J' giving J (1023)

10B

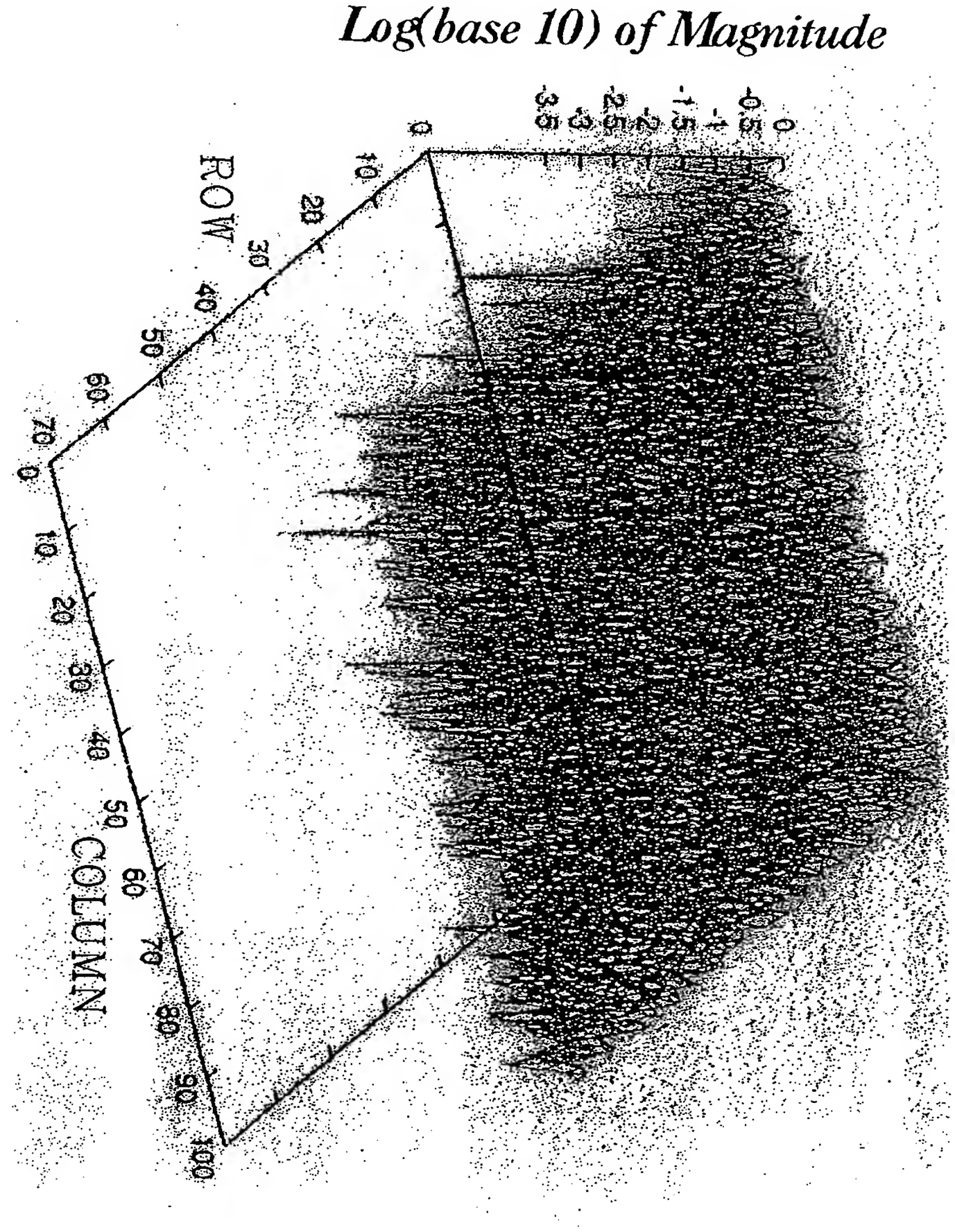

Log(base 10) of Magnitude
ROW
COLUMN
0
10
20
30
40
50
60
70
80
90
100

FIG. 11

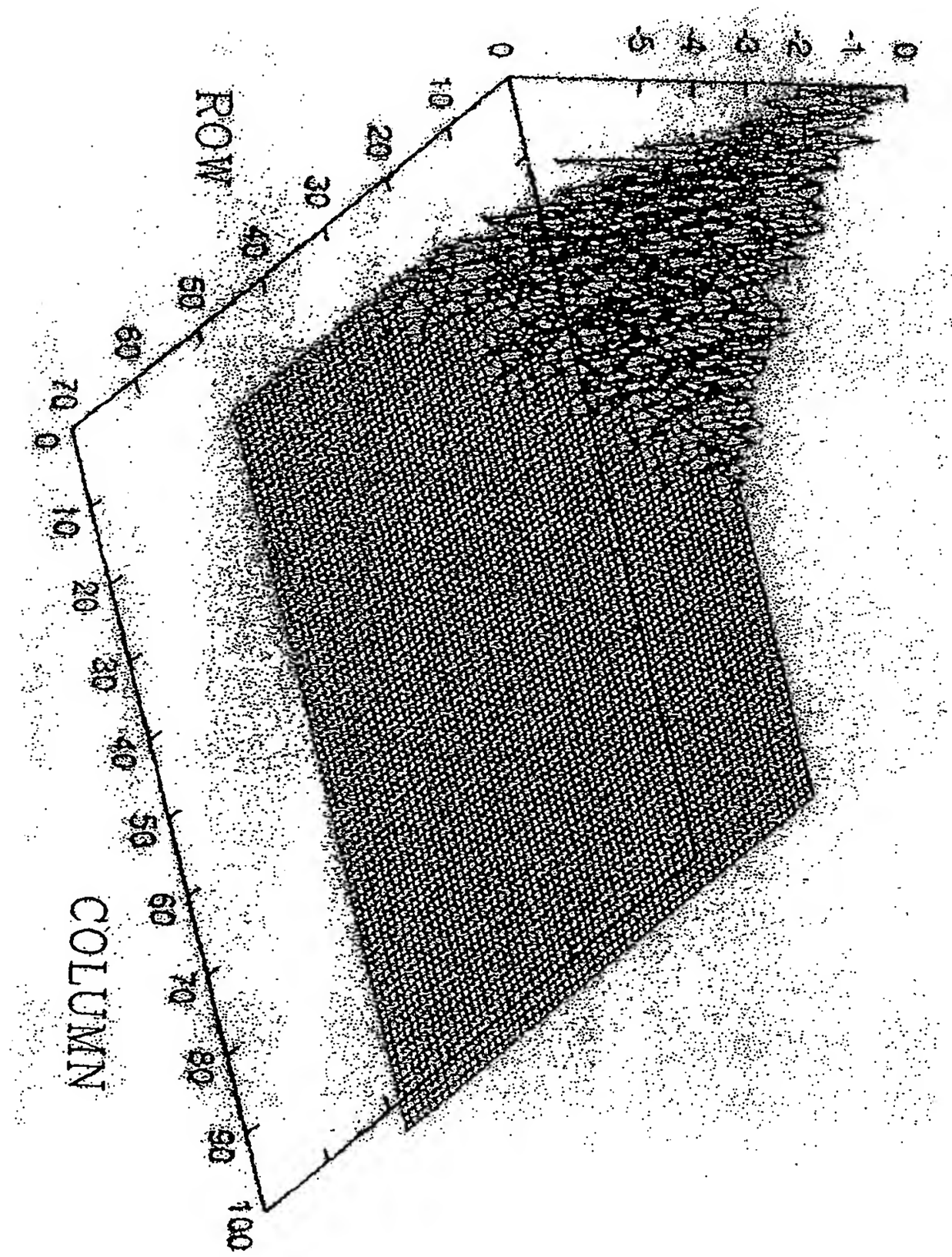
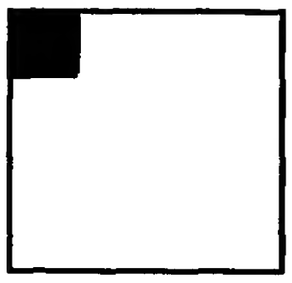

Log (base 10) of Magnitude
ROW
COLUMN
0
10
20
30
40
50
60
70
80
90
100

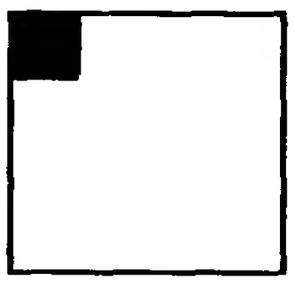
FIG. 12

$\tilde{A}_{i,j}$ =



i > j

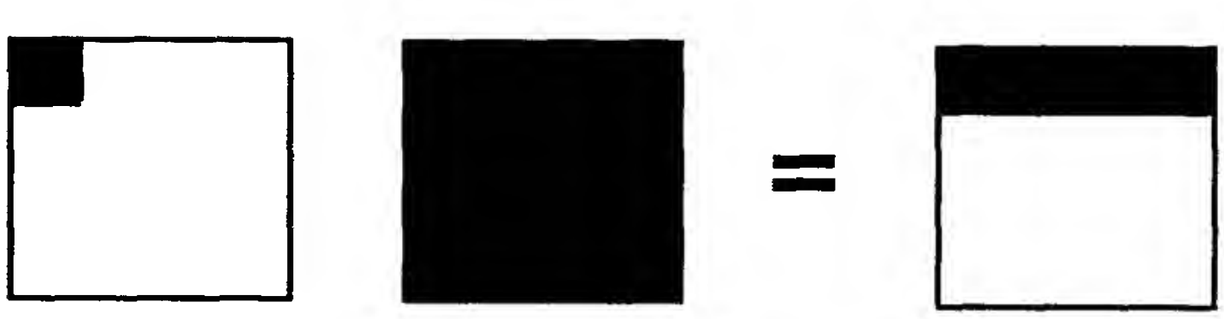
$B_{i,j}$ =



i < j

$B^{-1}_{j,j}$ =

$A_{i,j} = \tilde{A}_{i,j} B^{-1}_{j,j}$:



$A_{i,k} B_{k,j}$:

i < k k < j

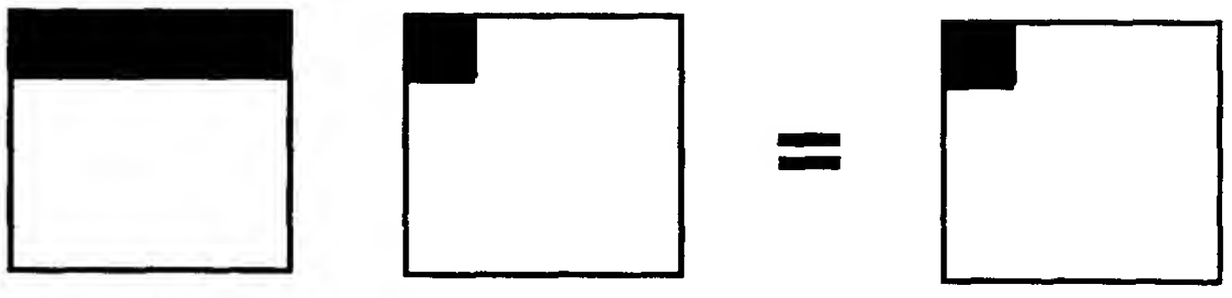


FIG 13

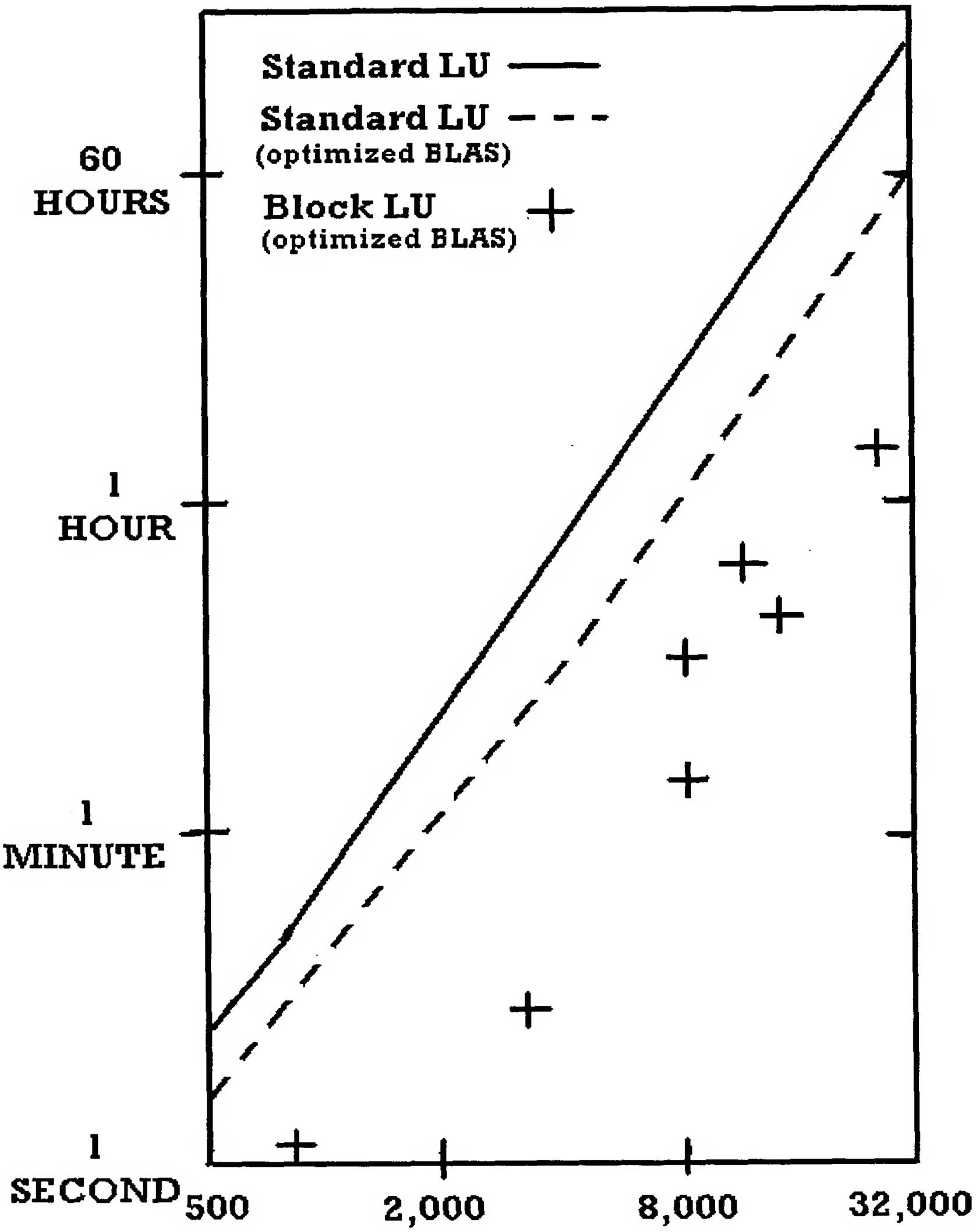

Standard LU
Standard LU
(optimized BLAS)
Block LU
(optimized BLAS)
60 HOURS
1 HOUR
1 MINUTE
1 SECOND
500
2,000
8,000
32,000
SIZE OF MATRIX

FIG 14